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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/577,722

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Mamoru Miyachi

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EXAMINER

MUSTAPHA, ABDULFATTAH B

ART UNIT

PAPER NUMBER

2812

NOTIFICATION DATE

DELIVERY MODE

10/10/2007

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

DCIPDocket@arentfox.com
IPMatters@arentfox.com
Patent_Mail@arentfox.com

Office Action Summary

Application No.

10/577,722

Applicant(s)

MIYACHI ET AL.

Examiner

Abdulfattah Mustapha

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 5/2/2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5,7,11 and 12 is/are rejected.
- 7) ☒ Claim(s) 6,8-10 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 May 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>5/2/2006 and 8/15/2006</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 – 5, 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitaguchi [US 2005/0062125] in view of Lin et al. [US 2004/0096999], and further in view of Okazaki et al. [US 2003/0062530].

As to claim 1, Kitaguchi disclose a first process for forming an underlying layer on a substrate; a second process for forming a mask having a number of microscopic opening portions on said underlying layer; a third process for forming a bump and dip shaped transfer layer having a number of projected portions made up of a plurality of microscopic planes inclined with respect to said substrate plane, by selective growth at each of said opening portions and by lateral growth on said mask; a fourth process for forming, on said bump and dip shaped transfer layer, a fifth process for forming a planarization layer having a flat principal growth plane, {Kitaguchi: [0052] – [0060], [0127] – [0158], [Figure 13]}, but fails to disclose a light absorption layer less in band gap energy than said underlying layer and said transfer layer; planarization layer; forming a structured light-emitting layer having at least an active layer on said planarization layer and decomposing said light absorption layer by irradiating the

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backside of said substrate with light reaching said light absorption layer to delaminate said substrate, the underlying layer, and the transfer layer from said planarization layer, wherein said planarization layer is employed as a light extraction face for extracting light produced in said active layer out of the device. However, Lin et al. disclose planarization layer, underlying layer, and the transfer layer from said planarization layer, wherein said planarization layer is employed as a light extraction face for extracting light produced in said active layer out of the device, {Lin et al.: [0017] – [0043]}. And Okazaki et al. disclose decomposing said light absorption layer by irradiating the backside of said substrate with light reaching said light absorption layer to delaminate said substrate, the underlying layer, and the transfer layer from said planarization layer. {Okazaki et al.: [0011] – [0020]}. It would have been obvious to one of ordinary skill in the art at the time of invention to modify the invention of Kitaguchi with a light absorption layer less in band gap energy than said underlying layer and said transfer layer; planarization layer; forming a structured light-emitting layer having at least an active layer on said planarization layer and decomposing said light absorption layer by irradiating the backside of said substrate with light reaching said light absorption layer to delaminate said substrate, the underlying layer, and the transfer layer from said planarization layer, wherein said planarization layer is employed as a light extraction face for extracting light produced in said active layer out of the device as taught by Lin et al. and Okazaki et al. in order to improve reliability.

As to claim 2, Kitaguchi disclose all the element of the claim except planarization layer is formed of n-type nitride semiconductor, and structured light-emitting layer is formed of a multi-layered structure starting with n-type nitride semiconductor from said planarization layer side and ending with p-type nitride semiconductor. However, Lin et al. disclose a planarization layer is formed of n-type nitride semiconductor. {Lin et al.: [0042]}. And Okazaki et al. disclose structured light-emitting layer is formed of a multi-layered structure starting with n-type nitride semiconductor from said planarization layer side and ending with p-type nitride semiconductor. {Okazaki et al.: [0011] – [0020], [0039]}. It would have been obvious to one of ordinary skill in the art at the time of invention to modify the invention of Kitaguchi by adding planarization layer is formed of n-type nitride semiconductor, and structured light-emitting layer is formed of a multi-layered structure starting with n-type nitride semiconductor from said planarization layer side and ending with p-type nitride semiconductor as taught by Lin et al. and Okazaki et al. in order to improve reliability.

As to claim 3, Kitaguchi disclose all the element of the claim except underlying layer, said transfer layer, said light absorption layer, said planarization layer, and said structured light-emitting layer are formed of nitride-based III-V compound semiconductor with a group-V element of nitrogen (N). However Lin et al. disclose underlying layer, said transfer layer, said light absorption layer, said planarization layer are formed of nitride-based III-V compound semiconductor with a group-V element of nitrogen (N). {Lin et al.: [0017] – [0043]}. It would have been obvious to one of ordinary skill in the art

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at the time of invention to modify the invention of Kitaguchi by adding the stated element in order to improve the reliability performance and increase the yield. And Okazaki et al. disclose structured light-emitting layer are formed of nitride-based III-V compound semiconductor with a group-V element of nitrogen (N). {Okazaki et al.: [0011] – [0020], [0039] – [0045]}. It would have been obvious to one of ordinary skill in the art at the time of invention to modify the invention of Kitaguchi by adding underlying layer, said transfer layer, said light absorption layer, said planarization layer, and said structured light-emitting layer are formed of nitride-based III-V compound semiconductor with a group-V element of nitrogen (N) as taught by Lin et al. in order to improve reliability.

As to claim 4, Kitaguchi disclose all the element of the claim except light absorption layer is of InGaN. However, Okazaki et al. disclose light absorption layer is of InGaN. {Okazaki et al.: [0039] – [0045]}. It would have been obvious to one of ordinary skill in the art at the time of invention to modify the invention of Kitaguchi by adding light absorption layer is of InGaN. However, Okazaki et al. disclose light absorption layer is of InGaN as taught by Okazaki et al. in order to improve reliability.

As to claim 5, Kitaguchi disclose all the element of the claim except substrate is formed of any one of sapphire, GaN, AlN, and SiC having a {0001} plane as a principal plane. However, Okazaki et al. disclose substrate 1 is formed of any one of sapphire, GaN, AlN, and SiC having a {0001} plane as a principal plane. {Okazaki et al.: [0039] – [0100], [Figure 1, 5 - 10]}. It would have been obvious to one of ordinary skill in the art at

the time of invention to modify the invention of Kitaguchi by adding substrate is formed of any one of sapphire, GaN, AlN, and SiC having a {0001} plane as a principal plane as taught by Okazaki et al. in order to improve reliability.

As to claim 11, Kitaguchi disclose all the element of the claim except adhering the surface of said structured light-emitting layer to the support member, the process being provided between said sixth process and said seventh process. However, Okazaki et al. disclose adhering the surface of said structured light-emitting layer to the support member, the process being provided between said sixth process and said seventh process. {Okazaki et al.: [0039] – [0100], [Figure 1, 5 - 10]}. It would have been obvious to one of ordinary skill in the art at the time of invention to modify the invention of Kitaguchi by adding adhering the surface of said structured light-emitting layer to the support member, the process being provided between said sixth process and said seventh process as taught by Okazaki et al. in order to improve reliability.

As to claim 12, Kitaguchi disclose all the element of the claim except structured light-emitting layer to provide semiconductor light-emitting devices of individually divided sizes. However Okazaki et al. disclose structured light-emitting layer to provide semiconductor light-emitting devices of individually divided sizes. . {Okazaki et al.: [0039] – [0100], [Figure 1, 5 - 10]}. It would have been obvious to one of ordinary skill in the art at the time of invention to modify the invention of Kitaguchi by adding structured

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light-emitting layer to provide semiconductor light-emitting devices of individually divided sizes as taught by Okazaki et al. in order to improve reliability.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kitaguchi [US 2005/0062125] in view of Lin et al. [US 2004/0096999] and Okazaki et al. [US 2003/0062530] as applied to claim 1 above, and further in view of Fukuda et al. [US 2003/0013266].

As to claim 7, Kitaguchi in view of Line et al. disclose all the element of the claim except opening portions of said mask are formed in a striped shape in parallel to a crystalline axis $\langle 1-100 \rangle$ or $\langle 11-20 \rangle$ of the underlying layer. However, Fukuda et al. disclose opening portions of said mask are formed in a striped shape in parallel to a crystalline axis $\langle 1-100 \rangle$ or $\langle 11-20 \rangle$ of the underlying layer. {Fukuda et al.: [Abstract], [0033]}. It would have been obvious to one of ordinary skill in the art at the time of invention to modify the invention of Kitaguchi by adding except opening portions of said mask are formed in a striped shape in parallel to a crystalline axis $\langle 1-100 \rangle$ or $\langle 11-20 \rangle$ of the underlying layer as taught by Fukuda et al. in order to reduce interface-trap..

Allowable Subject Matter

Claims 6, 8, 9 and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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Limitations:

"the opening portions of said mask are formed in said second process so that closest opening portions are located in a $\langle 1-100 \rangle$ orientation of said underlying layer, and all opening portion centers are a 6-fold rotational symmetry center" as read in claim 6.

"light absorption layer is of semiconductor containing an impurity to serve as a non-radiative recombination center or of indirect transition type semiconductor" as read in claim 8.

"an energy level of the light used to irradiate the backside of said substrate is less than a band gap energy level of said underlying layer and said transfer layer and is greater than a band gap energy level of said light absorption layer" as read in claim 9.

"the light used to irradiate the backside of said substrate has a wavelength of 360 nm or more" as read in claim 10.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Abdulfattah Mustapha whose telephone number is 571-272-9736. The examiner can normally be reached on Mon-Thus. (7:00am - 6:00pm).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on 571-272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Abdulfattah Mustapha


MICHAEL LEBENTRITT
SUPERVISORY PATENT EXAMINER